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Linear amplifier and Schmitt trigger using an analogue switch

Cross-Reference to Related Applications

This application claims priority to PCT application PCT/GB2004/001851, filed April 28,
5 2004, which claimed priority to British patent application 0313189.3, filed June 7, 2003.

Field of the Invention

The present invention concerns a linear amplifier and a Schmitt trigger which make use of an analogue switch.

10 Background of the Invention

Modern fluid extraction systems, for example hydrocarbon extraction wells, involve the installation of electronics downhole where the environmental temperature can typically be around 220E C. Therefore it is desirable to use electronic devices which can perform electronic functions at these temperatures. There are presently few integrated circuits which
15 have been designed specifically to operate at such temperatures that are commercially available. However, wideband linear amplifiers and Schmitt triggers, both of which are important downhole components, are not yet commercially available which can operate satisfactorily at these temperatures.

Summary

20 It is an object of the present invention to provide a linear amplifier and a Schmitt trigger which are suitable for use at high temperatures. This object is achieved by constructing the devices using an analogue switch.

In accordance with a first aspect of the present invention there is provided a linear amplifier comprising an input terminal and an analogue switch, with a switch input connected to the
25 input terminal and a switch output connected to the switch input to provide negative feedback.

The switch output may be connected to an output terminal.

The switch may also be connected to a supply voltage.

Preferably, the switch input is connected to the input terminal via a first resistance, and the
30 switch output is connected to the input terminal via a second resistance, so that a closed loop gain of the amplifier may be determined from the ratio of the second and first resistances.

In a preferred embodiment, the analogue switch is configured to operate at temperatures of at

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least 200EC.

In accordance with a second aspect of the present invention there is provided a Schmitt trigger comprising an input terminal and an analogue switch, with a switch input connected to the input terminal and a switch output connected to the switch input to provide positive feedback.

The switch output may be connected to an output terminal.

The switch may also be connected to a supply voltage.

Preferably, the switch input is connected to the input terminal via a first resistance, and the switch output is connected to the switch input via a second resistance.

In a preferred embodiment, the analogue switch is configured to operate at temperatures of at least 200EC.

Brief Description of the Drawings

The invention will now be described by way of example with reference to the following figures, in which:-

Figure 1 shows a schematic circuit diagram of a linear amplifier in accordance with a first embodiment of the present invention;

Figure 2 shows a schematic circuit diagram of a known analogue switch suitable for use with the present invention; and

Figure 3 shows a schematic circuit diagram of a Schmitt trigger in accordance with a second embodiment of the present invention.

Description of Preferred Embodiments

A configuration of a linear amplifier according to a first embodiment of the present invention is shown in Figure 1. The device comprises an analogue switch 1, which is preferably suitable for use at high temperatures, for example temperatures of at least about 200EC. An